

Hawaii Space Grant Consortium  
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<http://www.spacegrant.hawaii.edu>  
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### PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Hawaii Space Grant Consortium is a Designated Consortium funded at a level of \$845,000 for fiscal year 2010.

### PROGRAM GOALS

The Hawaii Space Grant Consortium (HSGC) inspires, nurtures, and trains the space scientists, space settlers, and aerospace engineers of the future. HSGC strategy and programs are dynamic and reviewed annually to reflect State as well as NASA program needs and include development and maintenance of the HiSTEM Pipelines of activities (undergraduate/graduate opportunities supported by pre-college activities in the areas of space science, engineering, and remote sensing), enhancing undergraduate education through research (fellowships, traineeships, and internships that **must** have a NASA focus) and course curricula, improving research infrastructure (Hawaii Space Flight Laboratory (HSFL)), training pre-service and in-service teachers (Future Flight Hawaii Programs), and educating the public about new NASA discoveries (Windward Community College Aerospace Lab, Planetary Science Research Discoveries), helping to strengthen the State economy (HSFL, supporting the Hawaii Governor's Innovation Initiative in robotics).

### PROGRAM/PROJECT BENEFIT TO OUTCOME (1,2, OR 3)

**Mr. Jeremy Chan – Outcome 1** – Jeremy Chan is an HSGC post-graduate fellow and Systems Engineer for the HawaiiSat-1 small satellite project. HawaiiSat-1 is a 90-kg small sat that is being co-developed with NASA Ames. Jeremy successfully led the student design team through the HawaiiSat-1 Critical Design Review in February, 2011. After completing his Master's, Jeremy would like to start a satellite business in Hawaii.

**Kelsey Auten – Outcome 1** – Kelsey Auten, a resident of Honolulu but an engineering student at Notre Dame, was an HSGC summer intern with HSFL. Kelsey worked with the HawaiiSat-1 team to build a full scale model of the satellite.

**Michele Bradley – Outcome 2** – Michele Bradley is a former HSGC Fellow who now teaches intermediate school at Island Pacific Academy on the island of Oahu. She has instituted an “Astronaut Academy” at her school and her students have experimented with Radio Astronomy, tracked the LCROSS and Jupiter 24 Missions, and built robots for her robotics class. Last year, her school funded her trip to Houston to attend the SEEC conference and tour Johnson Space Center.

## PROGRAM ACCOMPLISHMENTS

- **Outcome 1: *Hawaii Space Flight Lab (HSFL)*** – The HSFL is an HSGC Research Infrastructure program that is leveraging State, Federal (including NASA), and corporate partners to provide student and workforce training opportunities to design, build, launch, and operate small spacecraft. The State of Hawaii signed an agreement with NASA Ames to help with HawaiiSat-1. LEONDAS is HSFL’s two-launch demonstration project. HawaiiSat-1 will fly on the second HSFL mission. *Kauai Community College Interns* – Kauai CC has continued to expand its internship program with some interns working at the Pacific Missile Range Facility, others helping to establish a Kauai CC rocketry program, and still others involved in the design and construction of the Kauai CC UHF/VHF Ground Station that will be used by HSFL to communicate with satellites.
- **Outcome 2: *HI-STEM*** – HSGC maintains pipelines of activities from K-12 through graduate school that are collectively called Hawaii Science Technology Engineering and Math or HI-STEM. HI-STEM allows HSGC to channel students, especially underrepresented students, towards NASA and STEM careers. HI-STEM has three primary pathways (space science, engineering, and remote sensing) with evolving subject matter and activities that allow HSGC to adjust to NASA priorities and discoveries.
- **Outcome 3: *Windward Aerospace Lab*** – Windward CC is constantly expanding the offerings of its Aerospace Lab that includes flight simulators, a planetarium, radio telescopes, and soon, the HSFL education and public outreach center to track HSFL missions. Windward CC’s Dr. Jake Hudson is also helping with the Kauai CC rocketry program. *HSGC Assistance to the Imiloa Center* – HSGC is assisting the Imiloa Center to become part of the New York Space Grant Carl Sagan Memorial solar system exhibit. The Imiloa Center represents the closest star at the scale of the solar system contained in downtown Ithaca. *Astronaut Days of Discovery* – These days celebrate Hawaii’s astronauts and remain overwhelmingly popular. They showcase NASA and STEM presentations and hands-on activities. HSGC coordinates the events but Hawaiian Electric Company and American Savings Bank donate funds and volunteers to make the events successful.
- **NASA 2010 Education Priorities:** The HSGC has partnered with the State of Hawaii and others to host hands-on robotics programs (FIRST, Botball, MicroRobots) at the elementary and intermediate school levels. HSGC has a rich history of teacher training using hands-on NASA-related science content through Families Experiencing Science Together (FESTival Nights) that include a minimum of 8 science teachers

and 100 student-parent teams in an evening hands-on workshop, Future Flight Hawaii summer program that is a weekend long activity using related hands-on activities to replicate science missions to other planets, and the two Astronaut Days of Discovery where teachers help to run up to 20 hands-on activities for 600 students and parents during a day-long science fest. HSGC partners with Kapiolani Community College to sponsor an all-native Hawaiian CanSat team to the Texas CanSat competition to get entering freshman students interested in engineering and NASA careers. HSGC enjoys strong partnerships with many of the community colleges which in turn are now successful in attracting NASA funding on their own. In 2010, HSGC granted over \$200K (of which \$100K went to Windward and Honolulu Community Colleges, which are minority serving institutions) in grants to its minority-serving community college affiliates to encourage development of new NASA programs. HSGC encourages the career development of young faculty by providing mini-grants and travel awards as appropriate in order to further NASA research interests.

### PROGRAM CONTRIBUTIONS TO PART MEASURES

- Longitudinal Tracking: Total Fellowship/Scholarship awards in 2009 = 67; 31 of the total awards represents underrepresented minority F/S funding including 23 awards to women. 46 students are pursuing advanced STEM degrees, 21 of which are underrepresented, while 12 students are now with aerospace firms.
- Course Development: HSGC has developed 12 courses in Geology (305: Geological Field Methods, 460: Remote Sensing, 466: Planetary Geology, 593: Mission to the Red Planet, 611: Accelerated Intro to Geology, 673C: Petrologic Evolution of the Moon and Mars, 711(Seminar): Terrestrial and Space Energy Resources, 711(Seminar): Applied Field Methods Merging GPS and GIS Techniques), Geographic Information Systems (WCC 150: Intro to GIS), Electrical Engineering (199: Design Project, 496: Senior Capstone Project, 499: Senior Design Project), Mechanical Engineering (419: Astronautics).
- Matching Funds: HSGC maintains a 1 to 1 match of non-Federal support for the HSGC to non-Fellowship NASA Space Grant support; however, counting Federal support through other grants and contracts the ratio is approximately 8 to 1.
- Minority-Serving Institutions: UH-Hilo as well as all of the UH System Community Colleges are minority serving institutions. The HSGC maintains strong ties with its affiliates through dedicated associate directors. Windward, Honolulu, Kapiolani, Kauai, and Maui CC receive HSGC support for CanSat programs. Windward CC is also supported for the Aerospace Lab and for providing education and outreach for HSFL. Kauai CC has installed a UHF/VHF ground station for the HSFL and new research experiments.

### IMPROVEMENTS MADE IN THE PAST YEAR

New Horizons – HSGC held an internal mini-grant competition to increase support for minority serving institutions within HSGC for NASA research and education. Windward and Honolulu Community Colleges were awarded \$100,000 to expand rocketry, CanSat, and astronomy programs.

HSFL – HSFL supports many of NASA’s OCT goals including the development of a small spacecraft (HawaiiSat-1), small launch vehicle (SPARK), and mission operations architecture for controlling small spacecraft (COSMOS). Both HawaiiSat-1 and SPARK passed their Critical Design Reviews in the past year.

Percentage of Underrepresented Students Served – HSGC maintained support for underrepresented students who received 46% of 2010 awards and 45% of 2009 awards.

## **PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT**

### **EXECUTION**

UNIVERSITY OF HAWAII AT MANOA – 4-year university with graduate programs – Director Luke Flynn; Program Coordinator Marcia Rei Sistoso; Headquarters of HSGC and HSFL; majority of graduate and undergraduate fellows, interns, and trainees perform research in CubeSat and small satellite design, astronomy, planetary science, geology, engineering, marine science, remote sensing, and computer science.

UNIVERSITY OF HAWAII AT HILO – 4-year university with graduate programs – Associate Director Ken Hon; undergraduate fellows and trainees have focused research on the strong astronomy, geology, and remote sensing programs. UH-Hilo along with American Savings Bank hosts the Astronaut Ellison Onizuka Day public science program annually in January.

UNIVERSITY OF MAUI COLLEGE – 4-year university with graduate programs – Associate Director John Pye; undergraduate fellows and trainees have focused research in astronomy, optics, and STEM. The Akamai Internship Program gives students opportunities for internships through the Center for Adaptive Optics.

HAWAII COMMUNITY COLLEGE – Associate degree granting community college – Associate Director Joseph Wilcox; undergraduate focus on STEM and astronomy.

HONOLULU COMMUNITY COLLEGE – Associate degree granting community college – Associate Director Gregory Witteman; undergraduate fellows and trainees have focused research on CanSat design. HCC assists with Astronaut Lacy Veach Day which is a festival of science activities held on Oahu in October.

KAPIOLANI COMMUNITY COLLEGE – Associate degree granting community college – Associate Director John Rand; undergraduate fellows and trainees have focused research on CanSat design and competitions, and engineering. KCC receives Federal funding to attract underrepresented students to STEM careers and HSGC programs.

KAUAI COMMUNITY COLLEGE – Associate degree granting community college – Associate Director Stewart Burley (Strategic Theories Unlimited, Inc.); undergraduate fellows, interns, and trainees have focused research on STEM including satellite telemetry with a new ground station, rocketry, CanSat, meteorology, and optics.

LEEWARD COMMUNITY COLLEGE – Associate degree granting community college – Associate Director Roger Kwok; undergraduate fellows and trainees have focused research on astronomy. LCC assists with Astronaut Lacy Veach Day which is a festival of science activities held on Oahu in October.

WINDWARD COMMUNITY COLLEGE – Associate degree granting community college – Associate Director Joseph Ciotti; undergraduate fellows and trainees have focused research in astronomy, CanSat design and competition, and rocketry. WCC hosts the Aerospace Lab, serves as outreach for HSFL, and offers an aerospace certificate.

UNIVERSITY OF GUAM – 4-year university with graduate programs – Associate Director Mark Lander, undergraduate focus on STEM.

HAWAIIAN ELECTRIC COMPANY – industrial affiliate – Associate Director Paul Fetherland; HECO supports Astronaut Lacy Veach Day and other HSGC programs both with funding and volunteers.